Summer 1997

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NSU Oceanographic Center

Nova Southeastern
Oceanographic Center

Currents

Summer 1997 • Volume XI, Number 3

Program in Marine Environmental Sciences Gets Underway

Beginning with the Fall Term, an innovative new master's degree program in Marine and Environmental Sciences (MES) will be initiated within the Institute of Marine and Coastal Studies. The Fall Term starts on September 29, 1997.

According to IMCS Director **Dr. Richard Dodge**, "This is the only such program in the nation, that we know of. While there are environmental studies or sciences programs in other schools, we believe that we have the only one in *marine* environmental sciences.

"The degree offered is in a broad-based graduate program emphasizing aspects of the marine environment, including policy and global climate issues. Our program is unique in that we have evening classes so that students can work during the day and attend classes at night. This program complements very well our existing master's programs in Marine Biology and in Coastal Zone Management.

"We see this new degree as a terminal degree, and therefore only the Capstone Review option is available. The Capstone Review involves writing a review paper on an environmental topic as a culmination of the student's graduate experience. Nevertheless, we believe that the content of the program would allow the student to gain admission to environment-related Ph.D. programs elsewhere. We now see marine environmental science M.S. graduates obtaining jobs in government or marine-related companies. We believe there is a demand for this type of graduate, and we are seeking to fill the gap."

Dr. Dodge emphasizes that this degree can be completed in less than two years by taking classes at the Oceanographic Center during each of the four yearly terms. Although the program starts this fall, admission can be obtained during any term, at the convenience of the student. Besides the five CORE courses required in all three programs (Marine Chemistry, Concepts in Physical Oceanography, Environmental and Marine Geology, Marine Ecosystems, and Biostatistics), MES specialty courses consist of the following:

- Principles and Overview of Marine Environmental Science
- Marine Environmental Law
- Global Environmental Change
- Climatology
- The Marine Environment and Economics

For further information or to request application materials, call **Helene Taylor** at (954) 920-1909, or contact **Dr. Richard Dodge** or **Dr. Curtis Burney**:
Internet: dodge@ocean.nova.edu
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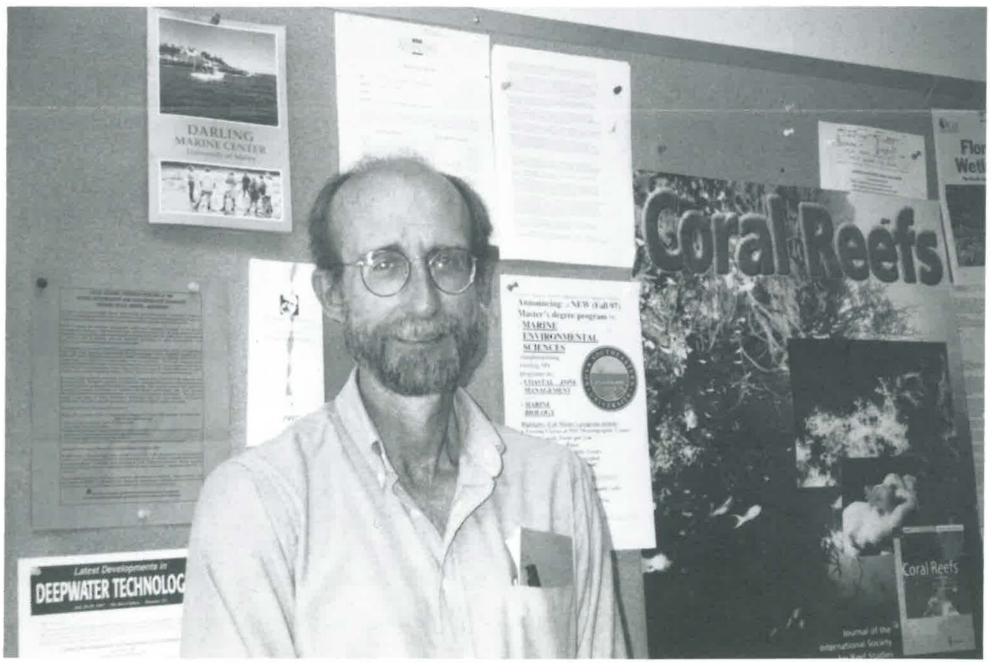
Home page: http://www.nova.edu/ocean/



Dr. Richard Dodge, Director of the Institute of Marine and Coastal Studies.

People on the Move

Dr. Alexander Soloviev attended the annual meeting of The Oceanographic Society, held in Seattle, April 1-4. He presented two posters, both co-authored by **Dr. Roger Lukas** and **Dr. Peter Hacker**, of the University of Hawaii. The first was titled "An Approach to Parameterization of the Oceanic Turbulent Boundary Layer in the Western Pacific Warm Pool." The second poster, also co-authored by **Drs. Mark Baker** and **Howard Schoeberlein**, of Johns Hopkins University, was titled "A Near-Surface Microstructure Sensor System Used during TOGA-COARE."

Dr. Soloviev also attended a weeklong TOGA-COARE meeting on air-sea fluxes in May. The conference was held at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado.

On May 30, **Dr. Julian McCreary** visited the NOAA/PMEL laboratory in Seattle, where he presented a seminar titled "On the Interaction between the Subtropical and Subpolar Oceans." While at PMEL he also visited **Dr. Dennis Moore**, former director of the Oceanographic Center.

Dr. McCreary attended the Gordon Research Conference at Colby-Sawyer College in New London, Connecticut, June 15-19. He participated in the conference as an invited discussion leader on Large-scale Observations and Dynamics.

During July 7-11, Dr. McCreary traveled to New Hampshire to attend the U.S. JGOFS (Joint Global Ocean Flux Study) Arabian Sea Workshop, held at the University of New Hampshire in Durham.

Dr. Charles Messing spent the first half of July in France, where he continued his collaborative research on crinoids with **Dr. Nadia Ameziane** at the Museum National d'Histoire Naturelle in Paris, and with **Dr. Michel Roux** at the Universite de Reims. They discussed the results of work on the systematics of deep-water feather stars from Indonesia. They also prepared for Dr. Messing's next submersible expedition in the Bahamas, planned for October.

Dana Rankin, one of Dr. Messing's M.S. students, spent a week in early August at the Smithsonian's National Museum of Natural History. There she examined the museum's collections of several genera of crinoids as part of her thesis research.

Dr. Richard Spieler and M.S. student **Robin Sherman** attended the International Workshop on "Fish Visual Census in Marine Protected Areas" in Ustica, Italy, June 26-28. The workshop was held at the Istituto Centrale per la Ricerca Scientifica e Technologica Applicata al Mare. Topics of discussion centered on protected marine reserve areas, primarily around the Mediterranean. Spieler and Sherman presented a poster, co-authored by Ph.D. candidate **David Gilliam**, titled "Differences in Length Estimates in Fish Census Data among Experienced Researchers." Besides representatives from the U.S., there were attendees from five European countries and Indonesia at the workshop.

Meanwhile, another of Dr. Spieler's students, Ph.D. candidate **David Gilliam**, as well as M.S. graduate **Pat Quinn**, **Dr. Mahmood Shivji**, and his M.S. student, **Lisa Lu**, attended a meeting of the American Society of Ichthyologists and Herpetologists, June 26 - July 2, at the University of Washington in Seattle. Gilliam presented a paper titled "The Importance of Post-Settlement Competition on Juvenile Reef Fish Recruitment in South Florida." Dr. Shivji presented a paper titled "Group I Introns ('Spintrons') Are Present in Shark Ribosomal DNA Internal Transcribed Spacers," and Ms. Lu and Dr. Shivji displayed a poster titled "Sequence Characterization of Nuclear Ribosomal DNA Internal Transcribed Spacer 1 (ITS1) in Groupers."

Dr. Shivji attended the American Fisheries Society conference in Monterey, California, August 23-29. He presented a paper titled "Molecular Markers for Shark Species Identification."

During August 24-30, Dr. Spieler and Ms. Sherman attended the Ninth International Congress of European Ichthyologists: "Fish Biodiversity," held in Trieste, Italy. The purpose of the meeting was to review the history and present the status of the world's fish fauna by multidisciplinary approaches. Spieler and Sherman presented a poster titled "Fine Structure of the Gull Vasculature of the Yellow Stingray (*Urolophus jamaicenses*)."

Dr. Spieler will travel to Paris for a meeting of the International Congress on Chronobiology, September 7-11. There he will present a poster on feeding rhythms in pompano.

Dr. James Thomas will attend a meeting of the Florida Association of Benthologists at Long Key, Florida, October 8-10. He will conduct a workshop and present a paper on "Use of Electronic Identification Guides."

Dr. Mahmood Shivji, Lisa Lu, Dave Gilliam, and Pat Quinn at Snoquamie Falls, Washington. (Photo courtesy of Dave Gilliam.)

(Continued on Page 7)

Cruise News

Dr. Richard Dodge and M.S. student **Daniel Anderegg** participated in a short coral drilling and photographic survey cruise in the Florida Keys, August 4-5. Also participating were **Dr. Peter Swart** and **Genny Healy**, from the University of Miami (RSMAS). The cruise was sponsored by the National Undersea Research Program (NURC).

This outing was intended to continue work begun earlier this year (May 1-8) during a NURC cruise. The focus of the cruise was to locate and drill suitable coral cores from inshore patch reefs of the upper and middle Keys. This was part of an effort by Dr. Dodge's coral lab and Dr. Swart's isotope lab to obtain coral skeletal cores for paleoenvironmental reconstructions of South Florida reefs. Various clinical analyses of coral skeletal material have been shown to be valuable proxies for such environmental parameters as temperature, salinity, and surface runoff, particularly in Pacific Ocean species. While this is true to a lesser extent of South Florida species, the potential remains great for this type of analysis to yield useful insights into recent water quality changes affecting the Florida Keys.

A total of 22 cores, mostly from *M. annularis* and *M. faveolata* colonies, were collected from Lower Mattecumbe Key to Key Largo. Resulting drill holes were plugged with cement and systematically photographed for a planned recovery study. The cores have been slabbed and X-rayed and are awaiting further analysis, along with 73 other cores that were drilled in September 1995 during a NURC/Harbor Branch Oceanographic Institution cruise having a similar purpose (see *Currents,* Fall 1995).

Daniel Anderegg and Dr. Richard Dodge, with coral core sample.

Alumni News

Clay Beauregard, who presented his Capstone Review Paper in May, left us on September 1, when he defected to Texas. He has entered the Ph.D. program in Medical Pharmacology and Toxicology at the Texas A&M University College of Medicine. His non-thesis option paper was titled "Ciguatera Fish Poisoning: Origin and Chemistry of Toxins, Pharmacology in Mammalian Systems, and Public Health Impacts in the Caribbean."

Gayle Stone, who defended her M.S. thesis in June, continues in her position as a biologist for Consul-Tech, an environmental consulting company located in Miami. Her thesis title was "Microplankton Biomass and Composition in Relation to the Gulf Stream Front off Southeast Florida."

Contracts and Grants Awarded to Researchers

Several contracts and grants have been awarded to Oceanographic Center research scientists in the past few months. They include:

Burney, Curtis: "Sea Turtle Monitoring," Broward County Commission, 4/4/97-4/3/98 ($79,389).

Klinger, Barry: "Dynamics of Three Dimensional Thermohaline Circulations," National Science Foundation, 8/1/97-7/31/98, Year 3 ($84,000).

McCreary, Julian: "Meridional Circulation Cells and the Maintenance of Tropical-Ocean Thermal Structure," National Science Foundation, 6/1/97-5/31/98, Year 3 ($185,000).

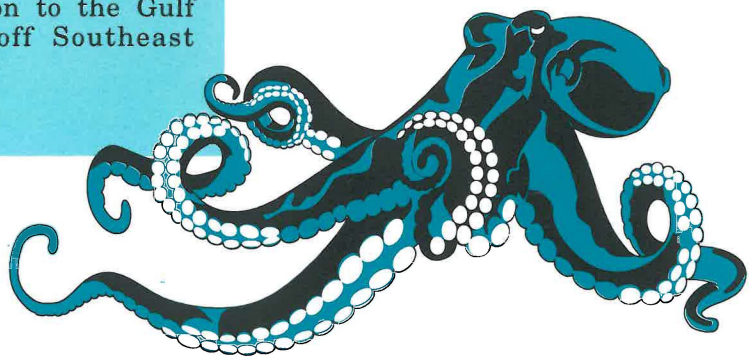
McCreary, Julian/Proehl, Jeffrey: "Dynamics of Tropical Instability Waves," National Science Foundation, 11/1/96-10/31/97, Year 3 ($80,000).

McCreary, Julian: "A Numerical Investigation of Mixed-Layer Processes in the Arabian Sea," Office of Naval Research, 11/1/96-9/30/99, Year 1 ($79,000).

McCreary, Julian/Klinger, Barry: "A Numerical Investigation of ENSO Decadal Variability," National Oceanic and Atmospheric Administration, 7/1/97-6/30/00, Year 1 ($114,929).

McCreary, Julian/Witte, Janet: "Editorship of the Journal of Physical Oceanography," American Meteorological Society, 7/1/97-6/30/98, Year 3 ($35,302).

Soloviev, Alexander: "Analysis of the Upper Ocean Velocity and Thermohaline Structure during COARE," National Science Foundation/University of Hawaii, 12/1/96-11/30/98, Year 2 ($26,450).

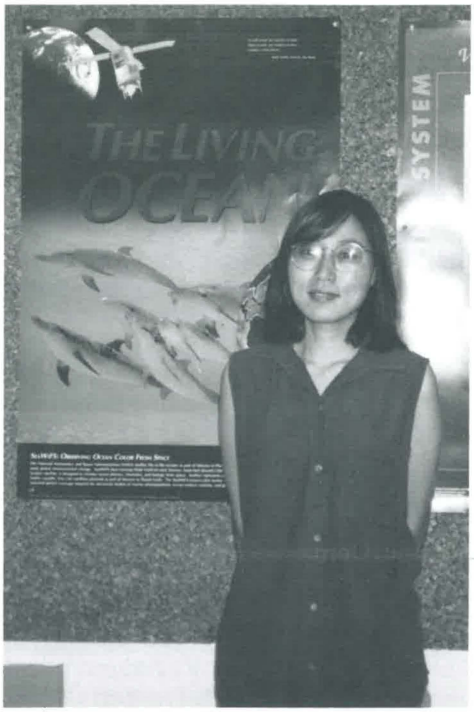


Weiqing Han Models Indian Ocean Circulation

Ph.D. candidate **Weiqing Han** continues her work on an innovative 3-1/2-layer model of the Indian Ocean. Her thesis is titled "The Influence of Salinity on Dynamics, Thermodynamics, and Mixed Layer Physics in the Indian Ocean." Working under the tutelage of **Dr. Julian McCreary** for the past five years, Weiqing has progressed to the point of predicting that she will finish her studies during the coming year.

Weiqing and Dr. McCreary have applied the Krause-Turner mixed-layer scheme to their Indian Ocean model. "This scheme shows that the rate of entrainment, which is the speed of water that gets into the surface mixed-layer from beneath, is determined from the turbulent energy production and the stratification of the ocean," Weiqing explains. "We are finding that salinity is very important to the mixed-layer physics in the Indian Ocean. The strong precipitation in the equatorial regions results in lower salinity. This reduction makes the stratification of the ocean more stable and causes a very thin surface mixed layer. As a result, the equatorial surface jet is strengthened by 20 to 30 cm/sec in the fall of the year."

In an earlier 2-1/2-layer model (*Progress in Oceanography*, 1993), McCreary, with co-authors **Drs. Pijush Kundu** (Oceanographic Center) and **Robert Molinari** (NOAA/AOML, Miami), investigated the circulation of the Indian Ocean without including the salinity factor. "This new investigation takes the Indian Ocean study one step farther," Weiqing states, "using a 3-1/2-layer model that does include the salinity effect. This approach has served to improve our understanding of the physical processes in the Indian Ocean."



Weqing Han in the computer room.

Recent Presentations

On June 27, **Dr. Barry Klinger** chaired a Physical Oceanography Roundtable, one of a series of discussions and informal seminars in physical oceanography held at the Oceanographic Center. This one was precipitated by the departure of Ph.D. graduate **Dr. Shuliang Zhang**, who left us on July 1 to assume his postdoctoral fellowship at the Woods Hole Oceanographic Institution on Cape Cod. The topic of discussion was "Double Hemisphere Thermohaline Flows: How Big, How Many, and When?"

Student Defenses

Several M.S. thesis defenses and Capstone Review Papers were presented at the Oceanographic Center during the summer months.

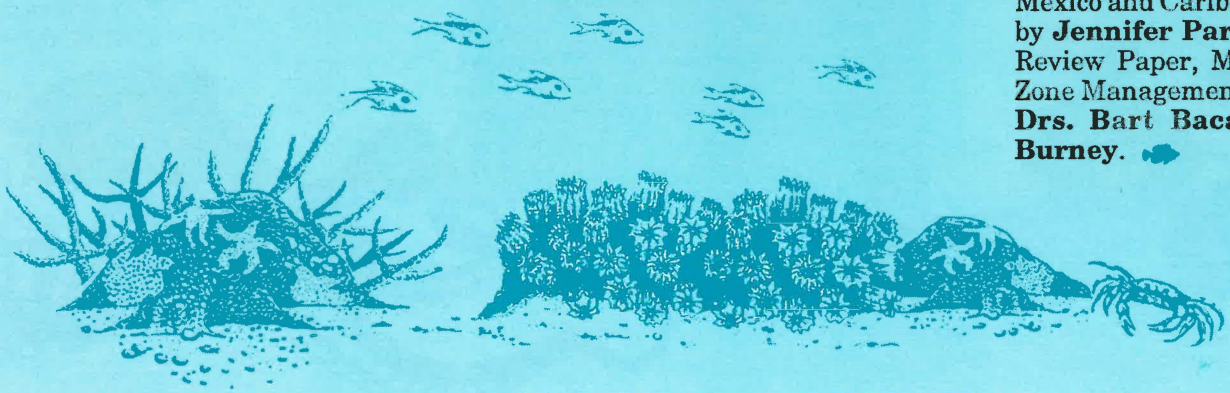
June 26: "Microplankton Biomass and Composition in Relation to the Gulf Stream Front off Southeast Florida," by **Gayle L. Stone**. Thesis defense, M.S. in Marine Biology. Committee: **Drs. Richard Dodge, Julian McCreary, Gary Hitchcock,** and **Bart Baca**.

June 30: "The Effects of Nutrient Pollution on Coral Reef Communities," by **Carin Klein**. Capstone Review Paper, M.S. in Marine Biology. Committee: **Drs. Curtis Burney** and **Richard Dodge.**

July 14: "Reducing Bycatch of the Harbour Porpoise (*Phocoena hocoena*) in the Northwestern Atlantic," by **Gregory Bonnet**. Capstone Review Paper, M.S. in Marine Biology. Committee: **Drs. Keith Ronald** and **Richard Dodge**.

July 21: "The Relationship Between Environmental Quality and Fish Health and the Impact of Degraded Ecosystems on Fish Populations and Future Fish Abundance," by **Neysa Gabriel**. Capstone Review Paper, M.S. in Marine Biology. Committee: **Drs. Joan Browder, Richard Spieler,** and **Richard Dodge.**

August 8: "The Effects of Oil Spills on *Rhizophora* Ecosystems in the Southern United States, Gulf of Mexico and Caribbean Regions," by **Jennifer Parris**. Capstone Review Paper, M.S. in Coastal Zone Management. Committee: **Drs. Bart Baca** and **Curtis Burney**.



UNDERCURRENTS
INSTITUTE OF MARINE AND COASTAL STUDIES

Fall Term Schedule

M.S. degree specialties are **Marine Biology, Coastal Zone Management**, and **Marine Environmental Sciences**. Each course carries three credit hours or may be audited. Tuition is $373 per credit hour (50 percent less for audit). Classes meet once a week from 6:30 to 9:30 p.m. at the Oceanographic Center. The fall term runs from September 29 through December 19, 1997. Registration ($25 nonrefundable) begins two weeks prior to the start of classes. For further information, call **Helene Taylor** at (954) 920-1909.

Environmental Policy (CZMT-0613/MEVS-5018): Discussions center on specific governmental policies that affect the needs of the earth's biota and society. Discussions also address recent changes in environmental policies that relate to human health risk, ecological risk, and economics. Specific concepts reviewed include ecological integrity; economic growth; carrying capacity; biodiversity; and ecosystem health, resilience, and sustainability. Instructor: **Mr. Stacy Myers** (Center adjunct). Begins Monday, September 29.

Marine Ecosystems (OCOR-5602): A CORE course. Focuses on marine ecological processes and functions. Provides an overview of the basic concepts of marine ecology, along with more detailed elements of the discipline, including diversity of organisms, feeding relationships, ecological roles, and reproduction. Emphasis is on coastal marine communities. Instructor: **Dr. Curtis Burney** (Center faculty). Begins Tuesday, September 30.

Marine Mammal Management (CZMT-0636/MEVS-5017): Deals with a variety of topics, including the physiological profile, anatomical structure, energetics, feeding habits, population dynamics, and interactions with man and other species. Comparisons are made for the four major groups of marine mammals. Instructor: **Dr. Keith Ronald** (Center adjunct). Begins Wednesday, October 8.

Marine Botany (OCMB-6070/CZMT-0808): Topics include morphology, life histories, taxonomy, physiology, and ecology of multi-cellular marine phototrophs, including algae, seagrasses, and mangroves. The field course will be taught for 6 to 7 days on Grand Bahama Island, October 15-20. Extra time will be spent on preliminary readings and post-trip reports. Extra costs include $300-600 for travel, room, and board. Instructor: **Dr. Bart Baca** (Center Director of Aquaculture). Begins Thursday, October 2.

Tropical Marine Fish Ecology (OCMB-6120/CZMT-0690/MEVS-5000): Covers the identification and ecology of tropical fishes, including coastal, estuarine, mangrove, and pelagic fishes. Current theories on distribution and abundance are discussed, as well as the natural history of local species. The course includes a one-week field trip to Long Key, Florida, October 19-26; additional costs include $250 for boat, laboratory, and room expenses at the Keys Marine Laboratory. A single, introductory class will be held on Friday, October 3, and additional time will be spent on independent preliminary readings and post-trip laboratory sessions. Instructor: **Dr. Richard Spieler** (Center faculty). Begins Friday, October 3.

The 5,000 Days: Environmental Futures and Human Choices (CZMT-0665/MEVS-5001), and *Beyond 5,000 Days (CZMT-0633/MEVS-5002)*: These are distance education courses. Call IMCS for additional information. Instructor: **Dr. Keith Ronald** (Center adjunct). Begins Wednesday, October 8.

Winter Term Schedule

The winter term extends from January 5 through March 27, 1998. Course descriptions will be published in the next issue of *Currents*.

GIS and Environmental Remote Sensing (CZMT-0639/MEVS-5023). Instructor: **Mr. Stacy Myers** (Center adjunct). Begins Monday, January 5.

Concepts in Physical Oceanography (OCOR-5601). This is a CORE course. Instructor: **Dr. Barry Klinger** (Center faculty). Begins Tuesday, January 6.

Environmental Regulation (CZMT-0621/MEVS-5019). Instructor: **Mr. Stacy Myers** (Center adjunct). Begins Wednesday, January 7.

Fish and Wildlife Management (CZMT-0805/MEVS-5015). Instructor: **Dr. Keith Ronald** (Center adjunct). Begins Thursday, January 15.

(OCMB: TBA).

5,000 Days: Environmental Futures (CZMT-0665/MEVS-5001) and *Beyond 5,000 Days (CZMT-0663/MEVS-5002)* are available by distance education. Instructor: **Dr. Keith Ronald** (Center adjunct).

Ph.D. Degree Offered

The Oceanographic Center offers the Ph.D. degree in Oceanography. The program requires a minimum of 90 credits beyond the baccalaureate. At least 48 credits must consist of dissertation research, and at least 42 credits must consist of upper-level course work. Required courses include the five M.S. CORE courses. Other upper-level course work usually is in the tutorial mode with the major professor. Tuition is $2,478 per quarter, beginning with the summer term.

IMCS Offers a Variety of M.S. Courses

Apart from the new program in Marine Environmental Sciences (MES), the Institute of Marine and Coastal Studies offers the following 3-credit specialty courses in Coastal Zone Management (CZM) and Marine Biology:

CZM/MES Specialty Courses

- Wetlands Ecology
- Dry Coastal Ecosystems
- Fundamentals of Aquatic Ecotoxicology
- Fish and Wildlife Management
- Oil Pollution Effects
- Marine Mammal Management
- 5,000 Days (distance education)
- Beyond 5,000 Days (distance education)
- Marine Environmental Policy
- Marine Environmental Regulation
- Marine and Coastal Water Resources Impacts and Management
- Marine Ecosystem and Everglades Restoration
- Marine Environmental Impact and Health Assessment
- GIS and Environmental Remote Sensing
- Techniques in Marine Environmental Monitoring and Assessment

Marine Biology Specialty Courses

- Marine Ichthyology
- Methods in Plankton Ecology
- Marine Invertebrates
- Marine Microbiology
- Marine Phytoplankton
- Functional Morphology and Physiology of Fish
- Molecular Marine Biology
- Phytoplankton Ecology
- Dynamic Biological Oceanography
- Marine Biodiversity*
- Fish Ecology*
- Florida Coral Reefs*
- Coral Reef Ecology*
- Biological Effects and Risks of Chemicals in Aquatic Environment**
- Aquaculture**
- Marine Botany**

* *also MES*
***also CZM/MES*

CZM Specialty Courses

- Principles of Coastal Zone Management
- Law and the Coastal Zone
- Coastal Engineering and Protection
- Ports and Harbors

A New Crop of Students Arrives

The following are M.S. students in the Institute of Marine and Coastal Studies who have joined us since last fall. Welcome aboard!

Larry Beerkircher, MB, University of Rhode Island
Lesley Bertolotti, SP, Michigan State University
Michelle Collins, SP, University of Miami
Erik Demicco, SP, Ramapo College of New Jersey
Jim Hall, SP, Massachusetts Institute of Technology
Scott Herber, SP, Kutztown University
Maurice Lecours, SP, Florida International University
Marti Maguire, MB/CZM, Tulane University
Brian Maybruck, MB, Ohio State University
Melissa Marchisin, SP, Florida Atlantic University
Madelyn Martinez, CZM, Oregon State University
Ray McDonald, SP, University of Miami
David McMahon, SP, Troy State University
Chris Petrie, MB, University of Alabama
Anthony Prudenti, MB, Richard Stockton College
Jeannine Rendon, SP, Alelphi University
Jose Rios, CZM, Universidad Santa Maria
Michael Robinson, MB, Indiana University
Bradley Smith, SP, Kutztown University
Dawn Welcher, SP, Michigan State University

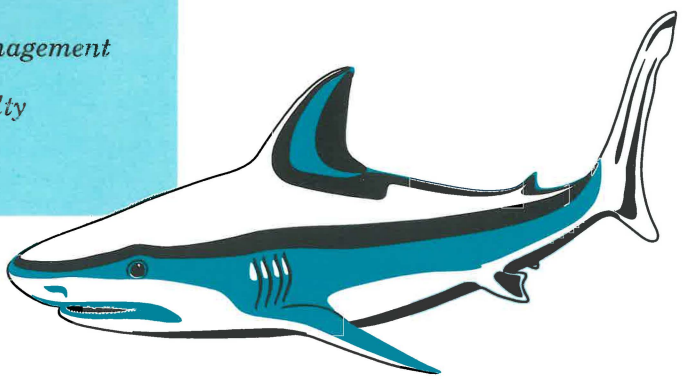
CZM: Coastal Zone Management
MB: Marine Biology
MB/CZM: Joint Specialty
SP: Special Student

Helene Taylor, Assistant to the Director of IMCS.

Students Receive Grant Awards

M.S. student **Susan Thornton** has been awarded a grant-in-aid in the amount of $700 by Sigma Xi, The Scientific Research Society, located in Research Triangle Park, North Carolina. Ms. Thornton is majoring in marine biology under the tutelage of **Dr. Joshua Feingold**.

Heather Balchowsky has been awarded a $1,200 grant in support of her research by the Lerner-Gray Fund for Marine Research, which is part of the American Museum of Natural History in New York City. Ms. Balchowsky is studying under **Dr. Mahmood Shivji** for the M.S. degree in marine biology.



Shark Research Flourishes at Oceanographic Center

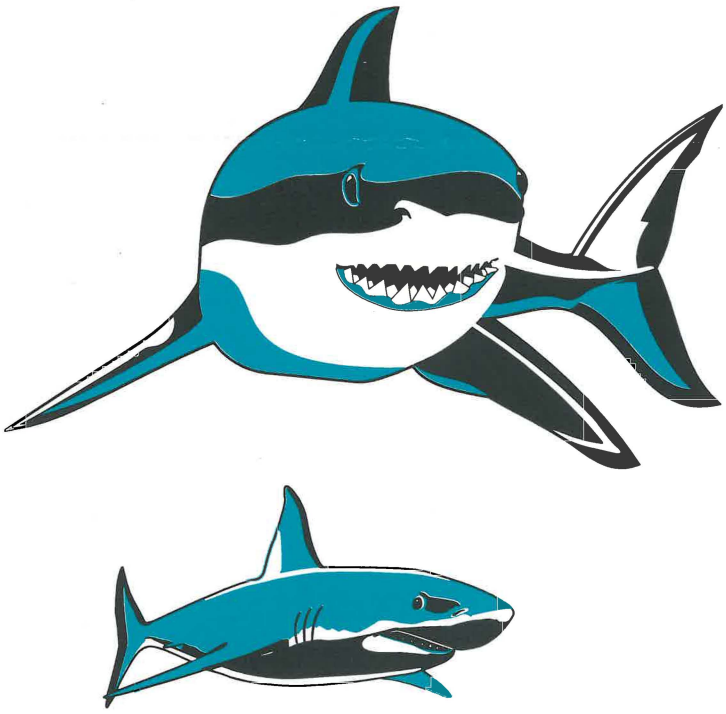
Dr. Mahmood Shivji's laboratory at the Center and **Dr. Michael Stanhope's** laboratory at the Queen's University in Belfast, Northern Ireland, are the scenes of intense research on the genetics of sharks. Two of Dr. Shivji's M.S. students crossed paths at the Queen's University this summer. **Brenda Ertan**, who spent February to June working there, was just leaving as **Heather Balchowsky** arrived. Heather will continue her work in the laboratory until late September.

Brenda learned to use an automated DNA sequencer, under the direction of Ph.D. student **Victor Waddell** (husband of former Center M.S. student **Marta Smith-Waddell**). She collected sequence data on nuclear and mitochondrial loci in various shark species. Her research involves using DNA sequences to infer population genetic structure of blue sharks on a global scale, as well as an examination of the structure and evolution of mitochondrial genome control regions in diverse shark lineages. "Shark populations have experienced alarming decreases over the last decade," states Dr. Shivji. "Brenda's research will contribute towards understanding the basic biology of sharks as well as provide information useful for management of blue sharks."

Brenda informs us that "Victor is now teaching Heather how to sequence DNA as well. I am now analyzing data and am in the process of writing my thesis," she continues. The title of her thesis is "The Global Genetic Structure of Blue Sharks." In reference to her studies with Dr. Shivji and Dr. Stanhope, she states, "We have expanded the study, and we are hopeful to get two publications from this work."

Victor Waddell, Brenda Ertan, Lynne McIvor, and Mine Dosay in the Queen's University lab.

Brenda Ertan and Heather Balchowsky catch up on U.S. news at The Crown (one of the oldest pubs in Belfast). (Photos courtesy of Brenda Ertan.)



People on the Move

(Continued from Page 2)

At the annual SAIL meeting of science library personnel at the Marine Science Institute in Port Aransas, Texas, on May 6: Ruth Grundy, meeting host, and Center Librarian Kathy Maxson. (Photo courtesy of Kathy Maxson.)

NOVA SOUTHEASTERN UNIVERSITY

Currents, Summer 1997

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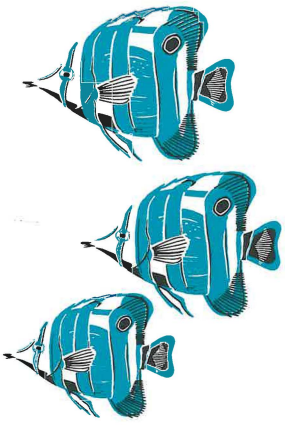

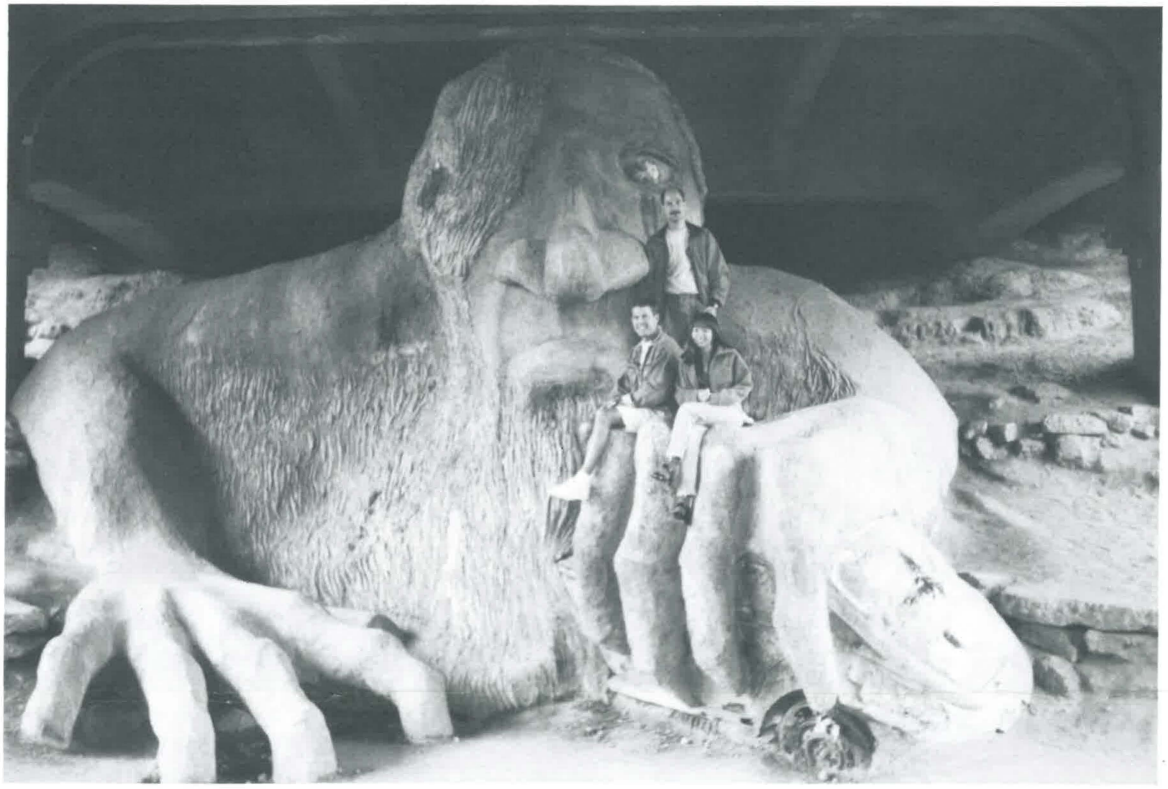

Dave Gilliam, Pat Quinn, and Lisa Lu aboard a troll lurking under a bridge in Wallingford, Washington. (Photo courtesy of Dave Gilliam.)

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